

Patent Claims

1. A vacuum distillation plant, comprising
  - a) a flash evaporator
  - b) a vapour concentration means and
  - c) a multi-stage condenser positioned downstream of the vapour concentration means

wherein means for recycling at least part of the condensate from a condensation stage to the bottoms product are included.

2. A vacuum distillation plant according to claim 1, comprising rectifications interposed between the condensation stages.
3. A vacuum distillation plant according to claim 1 or 2, wherein the condenser is positioned in such way that the bottoms product serves as a heat carrier liquid for the condenser before being recycled to the evaporator.
4. A vacuum distillation plant according to any of the claims 1 to 3 wherein two to four condensation stages are provided with a rectification interposed between each of said condensation stages.
5. A vacuum distillation plant according to any of the claims 1 to 4, wherein all or part of the condensate of the last condensation stage is recycled to the evaporator.
6. A vacuum distillation plant according to claim 5 comprising 2 condensation stages.
7. A vacuum distillation plant according to any of the claims 1 to 6 wherein the condensate is fed into the evaporator above the liquid level of the bottoms product.



8. A vacuum distillation plant according to any of the claims 1 to 6 wherein the condensate is introduced into and mixed with the bottoms product and the mixture is introduced into the evaporator.
9. A vacuum distillation plant according to any of the claims 1 to 8, additionally comprising means for actively directing the bottoms product through the condenser.
10. A vacuum distillation plant according to claim 9 wherein the means for actively directing the bottoms product is a circulating pump.
11. A vacuum distillation plant according to any of the claims 1 to 10 comprising a pre-vacuum pump in addition to the concentration means.
12. A vacuum distillation plant according to claim 11, wherein the pre-vacuum pump is an oil-driven liquid-ring pump.
13. A vacuum distillation plant according to any of the claims 1 to 12, comprising a means on the distillate side for depositing solid and/or liquid components entrained by the overhead product during flash evaporation.
14. A process for the inoffensive concentration of aqueous alcoholic solutions wherein
  - a) the solution is expanded under vacuum;
  - b) the overhead product is transported volumetrically and concentrated;
  - c) the overhead product is condensed in several stages for separation into its less volatile and more volatile components; and
  - d) at least part of the condensate of at least one stage is recycled to the bottoms product before said bottoms product is reused in step a) until the desired concentration has been reached.



15. A process according to claim 14 wherein the bottoms product is used as the heat carrier liquid for the condensation stages.
16. A process according to claim 14 or 15, wherein two condensation steps are carried out in step c) starting from binary solutions and wherein at least part of the condensate of the second stage is recycled to the bottoms product.
17. A process according to any of the claims 14 and 16, wherein the condensate is recycled in such an amount that the water/alcohol ratio of the solution in the bottoms product remains constant.
18. A process according to any of the claims 14 to 17, wherein the bottoms product is distilled by flash evaporation.
19. A process according to any of the claims 14 to 18 for concentrating aqueous ethanolic plant drug extracts having an ethanol content of at least 20 vol.-%, preferably 30 to 70 vol.-%.
20. A process according to any of the claims 14 to 19, characterised in that it is conducted with a vacuum distillation plant according to any of the claims 1 to 13.
21. The use of a plant according to any of the claims 1 to 13 for concentrating organic aqueous solvents containing extracts.

